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Ref: 8EPR-SR

February 28, 2002

Ms. Barbara O'Grady
Colorado Department of Public Health
and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530

RE: Vasquez Boulevard/ Interstate 70 (VB/I70) Site

Dear Ms. O'Grady:

Enclosed please find EPA's responses to the Colorado Department of Public Health and Environment on the revised draft proposed plan for the VB/I70 Superfund site residential soils operable unit.

Sincerely,

Bonnie Lavelle
Remedial Project Manager

enclosure

cc (w/encl):

Dan Scheppers
Ginny Brannon

EPA Responses to State of Colorado
Comments on the Revised Draft Superfund Proposed Cleanup Plan for the Vasquez Boulevard and I-70 (VB/I70) Site Residential Soils, Denver, Colorado

The following provides the comments from the Colorado Department of Public Health and Environment (CDPHE) on the revised draft Proposed Cleanup Plan in italicized text followed by EPA's response. Single comments that covered a range of issues have been split up as necessary to provide a clear response.

General Comments

1. *Some changes have been made to clarify the concerns expressed in our original comments but there are several places where changes still need to be made. We have offered specific suggestions for rewording in the specific comments but retain this comment for your reference. Throughout the document, characterization of risk issues and "acceptable" levels of risk are overly simplistic and may not be consistent with EPA's own guidance. On page 4 of the Proposed Plan, the statement is made that "EPA considers a safe level of a cancer-causing substance to be the level where cancer risks are 1 in 10,000 or less". The 1991 Clay memo (OSWER Directive 9355.0-30) states that "...A risk manager may also decide that a baseline risk level less than 10^{-4} is unacceptable due to site specific reasons and that remedial action is warranted".*

EPA Response:

EPA deleted the language on page 4 of the draft Proposed Plan, "EPA considers a safe level of a cancer-causing substance to be the level where cancer risks are 1 in 10,000 or less" and instead included the following language which accurately reflects EPA policy as stated in OSWER Directive 9355.0-30:

> "EPA generally requires that action be taken to reduce exposure to a cancer causing substance if the cancer risk is greater than 1 in 10,000. Sometimes EPA will require action where cancer risk is less than 1 in 10,000 if there is reason to believe that EPA underestimated the risk".

In other parts of the proposed plan, language which refers to certain levels of cancer risk as "safe" has been changed to "acceptable"as appropriate, consistent with EPA guidance and policy .

We agree that EPA policy provides that a risk manager may decide that a level of risk lower than 10^{-4} warrants remedial action where, for example, there are uncertainties in the risk assessment results. The proposed plan has been revised to indicate this policy and that the uncertainty analysis for VB/I70 concludes that the risk assessment is much more likely to overestimate than underestimate the true risks to residents at VB/I70. Therefore,

remedial action is not required at VB/I70 where calculated risks are 10^{-4} or lower. A summary of the information in the Administrative Record which supports this determination is as follows:

Consistent with EPA policy, EPA Region 8 considered the uncertainty in the risk assessment results for VB/I70. EPA applied the latest scientific methods of uncertainty analysis to the risk estimates for VB/I70. This analysis was done in collaboration with the technical advisor to the VB/I70 Technical Assistance Grant group, the Clayton, Elyria, and Swansea Environmental Coalition, as well as technical representatives of the State, the City of Denver, and Asarco in technical meetings of VB/I70 working group during the spring and summer of 2001. The results of the uncertainty analysis are documented in the final Baseline Human Health Risk Assessment which is part of the Administrative Record. Documentation of how EPA considered these results when developing remedial action alternatives is provided as an Appendix to the final Feasibility Study, also part of the Administrative Record. The main points specific to cancer risk associated with exposure to arsenic in soils are:

A. As part of the Remedial Investigation for the VB/I70 Site, EPA undertook several studies specifically to collect information on the characteristics of arsenic in soil that most effect exposure. This work was done to increase the accuracy (reduce uncertainty) of the risk estimates. This was part of an overall effort to address Environmental Justice (EJ) concerns at the Site. One of the EJ concerns communicated to EPA in meetings of the VB/I70 working group was to ensure that Superfund decisions are based on sound science. The first of these studies was an investigation to determine the relative bioavailability of arsenic in the soil found in the VB/I70 Site. The second was the Phase 3 Investigation in which data were collected to establish VB/I70 Site-specific relationships between:

I. Arsenic in yard soil and arsenic in house dust;
II. Arsenic in yard soil and arsenic in garden soils;
III. Arsenic in garden soils and arsenic in garden vegetables; and
IV Arsenic in the fine fraction of soil and arsenic in the bulk fraction of soil.

The studies served to reduce the uncertainty in the risk estimates by more accurately reflecting site-specific conditions that affect exposure to arsenic.

B. EPA performed Monte Carlo modeling as part of the uncertainty analysis in the Baseline Human Health Risk Assessment. The results indicate that the point estimate of risk for the Reasonable Maximum Exposure (RME) scenario is located at the 99th percentile of the risk distribution. This means that it is highly unlikely that the chronic arsenic exposures EPA has characterized for the VB/I-70 site are actually occurring in the people who reside there. These results indicate that the combination of exposure assumptions used by EPA for the chronic arsenic

exposure assessment at this site may be at the upper bound of or even beyond the reasonable maximum exposure scenario. The Monte Carlo analysis also showed that at properties where point estimate of risk is 1×10^{-4}, risks in the 90th percentile to 95th percentile range (the RME range) are 2×10^{-5} to 7×10^{-5}.

The Monte Carlo uncertainty analysis indicates that actual risks are much more likely to be lower than the calculated point estimates of risks.

EPA therefore does not believe that a level of risk lower than 10^{-4} as calculated in the Final Baseline Human Health Risk Assessment for VB/I70 warrants remedial action due to uncertainties in the risk assessment results. The uncertainties in the VB/I70 risk assessment are such that providing a level of protection at the 1×10^{-4} risk level based on the point estimates of risk is likely to provide a level of protection for the RME scenario in the range of 2×10^{-5} to 7×10^{-5}.

EPA policy also provides that a risk manager may decide that a level of risk lower than 10^{-4} warrants remedial action if a chemical specific standard that defines acceptable risk is violated, which is not the case at VB/I70; or if there are non-carcinogenic effects or an adverse environmental impact that warrants action. As indicated by the final Baseline Human Health Risk Assessment for VB/I70, clean up action at yards in VB/I70 where cancer risks based on the reasonable maximum exposure exceed 10^{-4} will protect against any chronic or subchronic non-carcinogenic effects associated with exposure to arsenic in residential soil. Therefore, it is not necessary to require action at properties where the RME point estimate of cancer risk is lower than 10^{-4} to protect against non-carcinogenic effects.

General Comment 1 continued:

The proposed plan does not reflect years of discussions held in the VBI70 working group and health team meetings which have identified specific EJ concerns, other chemical exposures in the VBI70 community, and evidence of additional cancer burden in the community, all of which indicate that this community might benefit from additional risk reduction strategies. Also, see general comment 5, below.

EPA Response:

Consistent with the National Contingency Plan, the proposed plan summarizes EPA's preferred alternative for addressing the public health risks from lead and arsenic in residential soils within the VB/I70 site and explains why it was selected. EPA relied on the information in the Administrative Record to identify the preferred alternative. That record reflects that EPA considered EJ concerns as discussed during meetings of the VB/I70 working group in the development of sampling plans, in strategies for gaining access for sampling purposes, in considering site specific behaviors that affect exposure to

soil, and in developing the community health program as a remedial option. As described in the Feasibility Study, the community health program that will go beyond addressing just contamination in soils and will incorporate strategies to address exposure to multiple sources of lead as well as strategies to reduce behaviors that might lead to excessive exposure to arsenic (and other substances) in soil. The community health program can serve to raise awareness in the community about sources of health risk other than soil. For example, the program can provide a means for other agencies to get their health messages to the community. If the community accepts the preferred alternative, we will raise overall community awareness about health through this program. The community health program addresses EJ concerns more effectively than additional soil removal. We agree that information we have reviewed about chemical exposures in the VBI70 community from sources other than residential soils (primarily sources of air pollution) and the preliminary information provided by the State on cancer incidence in the VB/I70 community indicate that additional risk reduction strategies beyond the Superfund remedial action may be needed to protect public health in the VB/I70 area. In order for such strategies to be effective, they must target the sources, chemicals, and exposure pathways that are contributing most to the increased risk in the community. As we have discussed in working group meetings, EPA proposes as part of remedial action to develop an area wide conceptual model that will not be limited to the consideration of the VB/I70 Superfund Site sources. This model will assess multiple sources of contamination, chemicals of concern, release mechanisms, transport mechanisms, exposure pathways, and people who are exposed. The resulting analysis will then be used to identify areas where potential risks are highest. Efforts to address cumulative impacts can then be prioritized to achieve risk reduction in these areas.

Recognizing that the Superfund program is focused on lead and arsenic in soil, EPA recently hired a full-time coordinator to identify various environmental impacts that could be contributing to the increased cancer risk. This coordinator will be working within all the other EPA programs and with State, local, and non-profit agencies. The area wide conceptual model is intended to help guide the effort to address cumulative impacts. EPA will add language to the proposed plan which briefly summarizes the development of an area wide conceptual model. With this modification, the proposed plan more completely reflects discussions in the working group regarding EJ concerns.

There is no general comment 5.

2. *Similarly, we retain this comment because there were still several places where rewording was necessary. We have included suggested language for those places. Discussions in the document about cancer risks should be framed in terms of protection of public health (i.e., risk levels of concern to public health) rather than in terms of what is "acceptable" or "unacceptable" to EPA. The reason that there is often dispute about what is an appropriate cleanup level is that there is increasing residual risk the higher the soil concentration level selected. A point estimate for a cancer risk has to be*

considered as a probability of increased risk occurring, and should not be framed as "safe" or "unsafe" level, as one might do with a non-cancer threshold value.

EPA Response:

EPA is obligated to use the terms "acceptable" and "unacceptable" in reference to cancer risk levels because Superfund is a regulatory program that established these terms and standards for them. Since the proposed plan is intended to explain why the preferred alternative was identified by EPA, these regulatory terms are important. The terms are used in the regulations and EPA policy for Superfund. We think it would be more confusing to the public to use terms which are inconsistent with those in EPA regulations and policy. In response to the State's comment, we have modified the proposed plan so that all language which refers to certain levels of cancer risk as "safe" or "unsafe" has been changed to "acceptable" or "unacceptable" as appropriate and consistent with EPA policy and regulations.

EPA notes that a point estimate of cancer risk is a probability that a person will develop cancer under specific conditions of exposure.

3. *The Proposed Plan appears to limit the community health program (CHP) to addressing (a) lead exposure and (b) potential arsenic exposure in pica children only. As described, it would not address high arsenic exposure in other children. This is not consistent with the description of biomonitoring in the Feasibility Study (page 31) which states that "...Biomonitoring would be appropriate at the VB/I70 site for identifying higher than normal exposures that results from RME behavior....as well as for evaluation of the effectiveness of other remedial action engineering and response components.*

EPA Response:

The CHP will not limit participation. The CHP will be offered to all children 6 to 72 months old residing in the VB/I70 site. However, the proposed plan accurately reflects that the CHP was developed specifically to address the potential risks to children from lead exposure and the theoretical potential risks of acute exposure to arsenic by children with soil pica behavior. Other potential risks to children will be addressed by the soil removal component of the preferred alternative. In fact, the Baseline Human Health Risk Assessment indicates that risks to children with short term high soil ingestion rates (the upper percentile soil ingestion rates published in EPA's Exposure Factors Handbook) were addressed by the EPA removal actions in 1998 and 2000. Please note that biomonitoring is only one component of the CHP and that the CHP is one process option that is combined with the soil removal option to comprise the preferred alternative. The proposed plan is consistent with the description of the full CHP contained in Section 5 of the Feasibility Study, "Development of Remedial Alternatives".

4. *Changes have been made to the presentation of the remedial alternatives however, CDPHE believes that the section on the preferred alternative could be improved. The presentation of the remedial alternatives considered to address site risks is very difficult to follow.*

EPA Response:

The presentation of the remedial alternatives has been revised to be easier to follow and in response to specific comments provided by the State.

Comment 4 continued:

Alternative 4, the preferred alternative, needs to be presented in a more thorough, considered fashion and include some discussion of residual risk issues and long term reduction in uncertainty (potential health risks to a pica child for instance). As written, EPA is apparently prepared to pay an additional $6.4 million for site cleanup without acknowledging any benefits to this alternative.

EPA Response:

The information in the proposed plan accurately reflects the information in the existing Administrative Record and is intended to explain why the preferred alternative was selected by EPA in consultation with the State. **The Administrative Record reflects that EPA is prepared to provide an additional $6.4 million for remediation to achieve State acceptance.** This is an important benefit of Alternative 4 and is EPA' s overriding consideration for selecting Alternative 4 as the preferred alternative. This is consistent with the National Contingency Plan since State Acceptance is one of the two "modifying criteria".

EPA carefully considered all the information in the Administrative Record to evaluate residual risks and long term effectiveness and permanence. The information indicates that Alternative 4 does <u>not</u> provide greater reduction in residual risk or long term reduction in uncertainty about the theoretical potential health risks to a pica child for the associated increased cost and short term risks when compared to Alternative 3. Also, providing equal protection to the Globeville and VB/I70 communities has been a concern of both EPA and the State since the start of work on the VB/I70 Site and was identified as a reason for the State requesting consideration of Alternatives 4 and 5. The information in the Administrative Record also supports the conclusion that the additional soil removals required in Alternative 4 are <u>not</u> necessary to achieve a level of protection against cancer risk equal to that provided by the State for Globeville residents.

The information which supports these conclusions is as follows:

A. **It is not necessary to perform soil removals where arsenic exposure point concentrations exceed 128 ppm in order to achieve protectiveness equal to the level of protectiveness provided by the State in Globeville.** This is supported by information in the Baseline Human Health Risk Assessment. Since data specific to Globeville are not available for the soil/dust ratio, relative bioavailability of arsenic in soil, nor the fine/ bulk ratio, the RME cancer risk associated with exposure to 70 ppm arsenic in soil (the action level for arsenic in residential soil at the Asarco Globe site) is determined by multiplying 70 ppm by the unadjusted Human Intake Factor (HIF) developed using standard exposure assumptions for the residential reasonable maximum exposure scenario and the unadjusted cancer slope factor for arsenic. The unadjusted HIF for chronic exposure to soil is developed in Section 4 of the final Baseline Human Health Risk Assessment and can also be found in Appendix E of that document.

RME cancer risks for 70 ppm soil in Globeville:

[70ppm] x [HIF (unadj.)] x [unadjusted slope factor] = 2×10^{-4} .

This risk level only considers exposure to soil. The addition of exposure to garden vegetables would result in a cancer risk greater than 2×10^{-4} at 70 ppm. Alternative 3 requires soil removals at all yards where the point estimate of cancer risk exceeds 10^{-4} , and RME risks exceed the range 2×10^{-5} to 7×10^{-5} . Therefore, the additional soil removals required in Alternative 4 are not necessary to achieve a level of protection against cancer risk equal to that provided by the State for Globeville residents.

B. **Alternatives 4 and 5 do not provide greater overall protection of human health for the increased cost.** The additional soil removals required in Alternatives 4 would address RME point estimates of cancer risks within EPA's acceptable risk range (between 8×10^{-5} and $10^{-4)}$ and would provide this protection for the 99th percentile of the exposed population, exposures which are likely not occurring at the site. The additional soil removals would not effectively address the theoretical risk of acute effects from soil pica behavior. The information in the Baseline Human Health Risk Assessment and the Feasibility Study demonstrates that, because it is not known how much soil children with pica behavior ingest, under some scenarios there theoretically is a concern about acute effects from exposure to arsenic in yards with background levels of arsenic in soil. EPA concludes that it is more effective to address the theoretical health risks associated with soil pica behavior by implementing a comprehensive program that includes as one component, strategies to reduce the behavior. In other words, we can't remove and replace soil to declare soil pica behavior safe. The additional soil

removals required in Alternative 4 would not appreciably reduce the theoretical risks associated with soil pica for the above reason and also because the hazard quotients at yards where soil was not removed is predicted to be between 4 and 20. The additional soil removals would entail greater short term risks however, leading to the conclusion that there is not an overall greater protection of human health for the increase in cost associated with Alternative 4 when compared to Alternative 3. EPA guidance requires that short term risks be considered in the evaluation of overall protection of human health.

In the case of Alternative 5, the additional soil removals would also address risks within EPA's acceptable risk range, also providing this protection for exposures which are likely not occurring at the site. Unlike the other alternatives, Alternative 5 contains no community health program and therefore will not address the theoretical risk of acute effects to children with soil pica behavior as effectively as those alternatives that include the community health program option, designed in part to reduce the behavior. In addition, from a community perspective, Alternative 5 may not provide the highest overall protection since it is likely that other sources of lead exist that would not be identified under this alternative and the occurrence of soil pica behavior would not be affected. The large number of additional soil removals would entail greater short term risks however, leading to the conclusion that there is not an overall greater protection of human health for the increase in cost associated with Alternative 5.

Specific Comments:

Announcement of the Proposed Plan: In the 4th paragraph of the introductory portion of the document please revise the first sentence to read: "In the final cleanup decision, made after the comment period is over, EPA in consultation with the state may modify the preferred..."

EPA Response:

The requested revision has been made.

History of the VB/I70 Site

In the last sentence of the first paragraph, revise to read " crabgrass and lawn pests ***that*** *were available...". Add: "Arsenic may still be found in some commercially available lawn care products."*

EPA Response:

EPA modified the this section of the proposed plan. However, please note that the form

of arsenic found in the VB/I70 Site soils is predominantly arsenic trioxide. We are not aware of consumer products that are still commercially available that are formulated with this form of arsenic. Therefore, we did not include the second portion of the language suggested by the State.

While the third sentence of first paragraph has been revised, the second sentence of the second paragraph need to be revised as well to read: "...due to smelting activities, the use of lawn products, and/or other as yet unknown activities, these substances..."

EPA Response:

EPA did not make this suggested change because it would not reflect the information in the Administrative Record. The final conceptual model for Operable Unit 1 indicates that the contaminant sources currently under consideration by EPA are current or historic smelters and lawn care products. The revised proposed plan accurately reflects this.

Soil Sampling Results

First paragraph: Please strike the word "striking". Alternate wording could be "One of EPA's findings was..." or "EPA's sampling found...".

EPA Response:

EPA did not make the suggested change because we want to communicate how unusual the pattern of arsenic contamination is in residential soils at the VB/I70 site.

How are [residents getting] exposed to arsenic and lead in soil?

In the second paragraph "Nobody knows how many children engage in soil pica behavior or how often, but it is thought to be rare." Please revise the sentence to indicate that this is EPA's opinion since there is still a tremendous amount of controversy surrounding this issue. Suggested alternate language: "While no one knows how many children engage in soil pica behavior or how often, EPA believes that such behavior is rare."

EPA Response:

EPA did not modify the language as suggested because the language is taken from EPA's Exposure Factors Handbook and summarizes the information that is currently available in the scientific literature.

At the first check mark in the paragraph beginning "Overall, EPA...", please revise using language other than "incidental" with respect to soil ingestion whenever possible in this document. This must be one of the most unfortunate terms in the entire lexicon of

risk assessment. An example of alternative language is "ingest soil and dust through routine hand-to-mouth contact during activities such as playing or working outdoors".

EPA Response:

The suggested modification has been made.

Non-Cancer Effects of Arsenic Exposure

Please revise by calling systemic effects "health effects other than cancer" rather than "non-cancer" effects. We suggest discussing the cancer effects of arsenic exposure first, to help put other types of effects into perspective for people.

EPA Response:

The requested changes were not made for the following reasons: (1) EPA wants to make the point that the non-cancer effects being discussed are due to arsenic exposure. We used the language suggested by the State but found the phrase "health effects other than cancer from arsenic exposure" to be less concise and chose not to use it. The meaning of the language in the proposed plan is the same. (2) The discussion on health effects is organized by duration of exposure, from acute, to subchronic, to chronic to lifetime. Therefore, to discuss cancer effects first as suggested by the State would not be consistent with this organization.

Cancer Effects of Arsenic Exposure

In the last sentence of the first paragraph, isn't that the level of excess cancer risk? It may be helpful to put paragraph 4 first, to put into context the notion of excess risk, or risk in addition to the risk of just living in Colorado.

EPA Response:

The cancer risk discussed in this paragraph is not "excess" cancer risk. It is cancer risk as a result of exposure to the particular substance. No revision to the text have been made. EPA also did not move the discussion of cancer risk to residents of Colorado as suggested by the State. The discussion was purposely put where it is because it is intended to provide the reader with a means of putting 1 in 10,000 cancer in context. Therefore, EPA discusses 1 in 10,000 first and then asks the reader to consider this in comparison to the cancer risk to residents of Colorado.

Delete the extra period at the end of the last sentence in paragraph one.

EPA response:

The requested revision has been made.

The second paragraph that references squamous cell carcinoma has not been changed. We had understood that this type of skin cancer is relatively easy to detect and is almost never fatal. Please verify. Suggested rewording: " There is strong evidence ...increases the risk of ***certain types of*** *skin cancer. The most common type of skin cancer linked to arsenic is squamous cell carcinoma, which appears to develop from some skin corns. Although these cancers can be painful and disfiguring, they are easily removed and curable when treated."*

EPA Response:

The language in the proposed plan was taken directly from the final Human Health Baseline Risk Assessment. Nevertheless, EPA changed the language as suggested by the State.

Delete the last sentence in paragraph four. Alternatively, if this paragraph is moved to the beginning of the discussion, it might be an opportunity to discuss the concept of "excess" cancer risk.

EPA Response:

The requested revision was not made. Please see EPA's response to the State's general comment number 2.

Arsenic Risks

The arsenic risk discussion still needs clarification. With the revised format, you could easily delete the title "Arsenic Risks". There is no longer a corresponding "Lead Risks" section.

EPA Response:

The requested revision has been made.

In paragraph three of this section. Delete "Risks at these properties are considered to be unacceptable and" and replace with "Cleanup action is required at all properties exceeding this risk level."

EPA Response:

The requested revision was not made. Please see EPA's response to the State's general comment number 2.

We suggest deleting the last paragraph in its entirety. It is confusing.

EPA Response:

The requested revision was not made. EPA believes it is important for the public to know that the clean up action will protect residents from both unacceptable risks of cancer and non-cancer effects.

What are the health risks to children who have soil pica behavior?

In the second paragraph, EPA implies that there is a cleanup option to address pica behavior. Since that option is the Community Health program, it is more straightforward to refer to it directly. Suggested revised wording for the last sentence is as follows: "Nevertheless. Because of the potential risk, EPA has developed a Community Health Program to protect children with soil pica behavior at the VBI70 site."

EPA Response:

The requested revision was not made. The language in the proposed plan accurately reflects that EPA considered not only the Community Health Program but also a soil removal option to address the theoretical risks to children with soil pica behavior.

What are the health effects from too much exposure to lead?

This discussion should include the fact that there are often no outward visible signs of lead poisoning in children, which is why blood lead measurements are the best method available to determine when excess exposure is occurring. Suggested rewording would be to insert "Often there are no visible signs of lead poisoning in children," Between the first and second sentences.

EPA Response:

The requested revision has been made.

*What cleanup alternatives **did EPA consider**?*

EPA Response:

The requested revision has been made.

Revise the introductory paragraph to read "Cleanup alternatives were developed because EPA determined that the arsenic or lead levels found in some yards may be present at levels where EPA normally requires cleanup action.

EPA Response:

This paragraph has been completely revised in response to comments from EPA internal reviewers and this comment from the State.

*The paragraph titled Community Health Program should be made into several paragraphs. We suggest a new paragraph at "If any child was identified..." and at "In the response program, EPA would address..." Also, change "If any child was..." to "If any child **were**..."*

EPA Response:

The requested revisions have been made.

Soil Tilling/Treatment

Please insert "Soil tilling/treatment is not effective for treating arsenic contaminated soils," between the first and second sentences. It is at least implied that this is the case. Perhaps you should clarify why tilling would not be effective for arsenic.

EPA Response:

Many process options including tilling and treatment were considered for both arsenic and lead in residential soils. It is beyond the scope of the proposed plan to describe all of the options and why they were ultimately screened from further consideration by EPA. The proposed plan simply describes the technologies and process options which survived the initial development and screening of remedial technologies and process options.

Soil Removal and Disposal

*Revise the first sentence to read "This option would address cancer risk **from arsenic** and the risk to children from..."*

EPA Response:

The requested revision has been made.

Table 1: Options Considered by EPA to Address Public Health Risks...

The table is still unclear. Specifically, why is arsenic at 240 used when the preferred alternative is to clean up at 128ppm?

EPA Response:

An arsenic level greater than 240 ppm is identified in Table 1 as the level of public health concern because arsenic levels greater than 240 ppm are predicted to pose a risk of cancer greater than 1 in 10,000 to residents with reasonable maximum exposures. This is the level of cancer risk that is of public health and regulatory concern to EPA at VB/I70. For the reasons summarized in EPA responses to the State's comment number 1 and comment number 4, calculated point estimates of reasonable maximum cancer risks due to arsenic exposure that are less than 1 in 10,000 at VB/I70 are not considered to be unacceptable risks. EPA's selection of Alternative 4 which requires remediation of properties where arsenic levels are greater than 128 ppm, was based on consideration of State Acceptance as a modifying criterion consistent with the National Contingency Plan. Table 1 summarizes only considerations of protection of human health. The addition of 128 ppm arsenic as a level where there is a concern about unacceptable cancer risks to long term residents would not be accurate and is not supported by the Administrative Record. The basis for consideration of 128 ppm as an action level for arsenic in soil is described in the section on the description of the alternatives.

Also, if the Community Health Program is part of the cleanup option to address levels of lead that exceed 208 ppm, then why not replace the reference to 540 ppm with 208 ppm?

EPA Response:

EPA added language to the section on lead risks to explain that, based on consideration of the uncertainty in the Integrated Exposure/Uptake Biokinetic Model which predicts that there is a concern about lead in soil in a range of 208 -1100 ppm and specific information about measured blood lead levels, EPA concluded that lead in soil may is a concern to children at levels greater than 540 parts per million in order to be protective. Table 1 has been modified to accurately reflects that 540 parts per million lead is the level of lead in soil where there may be a health concern which requires engineering action for soil, 208 parts per million lead is the level of lead in soil where there may be a health concern if a child is exposed to multiple sources of lead such as soil, paint, home remedies, or other sources.

At our meeting on 2/5/02, we all agreed to remove the table. We still recommend removing the table and revising the wording of the paragraph that refers to the table.

EPA Response:

EPA removed the table and generated a draft proposed plan without the table included. This required that we explain how each technology or process option would address the potential health risks for each of the 5 cleanup alternatives. This organization resulted in a proposed plan that was considerably longer and repetitive. Therefore, EPA opted to put the table back into the proposed plan. To address the concerns of reviewers who indicated that the original table was confusing, EPA added clarifying language to the title and the column headings.

Modifying Criteria

In the last paragraph, please revise to read " In the case of VBI70, CDPHE has already indicated to EPA a preference for Alternative 4, allowing... "

EPA Response:

The requested revision has been made.

The Five Cleanup Alternatives

Cleanup Alternative 1:

Please add at the end of the last sentence, "...of soil pica children, to the remaining yards with arsenic and lead that pose a health risk."

EPA Response:

The text has been modified to include a reference to Table 1. We believe this addresses the State's comment.

Cleanup Alternative 2:

In the third paragraph, please revise the second sentence to begin "This alternative also includes... "

EPA Response:

The text has been significantly revised to address the State's comment as well as the comments from other reviewers.

Table 2: Comparison of Remedial Alternatives Against the Superfund Evaluation Criteria

None of the suggested revisions to this table that we submitted in our initial comments has been included. While we are resubmitting these comments, we still believe this table should be removed completely as was discussed and agreed at our meeting on 2/05/02.

EPA Response

EPA did not agree to remove Table 2 from the proposed plan in the February 5 meeting between EPA and the State. EPA agreed to consider replacing the symbols with text and re-formatting the table so that each row was an evaluation criterion and each column was a ranking order (first to last or best to worst). This version of Table 2 would have an alternative in each box rather than a symbol. After considering both versions of Table 2, the original version is included in the revised proposed plan at the suggestion of many other reviewers chiefly because it was easier to understand. In the revised proposed plan, EPA included a discussion of the evaluation criteria in the description of each cleanup alternative and also included ranking symbols for each alternative to indicate how each ranked against the criterion State Acceptance. We believe this provides a more balanced view of how Alternative 4 compares to the other alternatives. Table 2 is included because many reviewers felt that the summary provided in Table 2 is essential since it provides a simple visual summary of the technical discussion of the comparison of alternatives. Based on EPA's experience at other Superfund sites, some reviewers in the general public will find this easier to understand than the technical discussion.

1. Overall Protection of Human Health and the Environment: We do not agree with the conclusion that since Alternative 5 doesn't include the community health program that it would not reduce the occurrence of soil pica behavior. This seems to discount the fact that cleaning up more properties is more protective.

EPA Response:

Cleaning up more properties is not more protective against the risks of soil pica behavior or the risks of exposure to lead from multiple sources. Alternative 5 is a large engineering construction project that would consist of soil removal, disposal, and replacement with no public health based actions to affect the occurrence of soil pica behavior or exposures to sources of lead other than soil. Information in the Administrative Record indicates that without public health actions, there would be children with elevated blood lead levels and there would still be theoretical risks of acute effects to children with soil pica behavior after the soil removal actions were completed.

The information in the Feasibility Study indicates that additional soil removals would not address the theoretical risk of acute effects from soil pica behavior as effectively as the measures provided by a Community Health Program. The information in the Baseline

Human Health Risk Assessment and the Feasibility Study demonstrates that because it is not known how much soil children with pica behavior ingest, under some scenarios there is a concern about possible acute effects from exposure to arsenic in yards with background levels of arsenic in soil. EPA concludes that it is more effective to address health risks associated with soil pica behavior by implementing a comprehensive program that includes as one component, strategies to reduce the behavior. In other words, we can't protect children from the theoretical acute effects from exposure of soil pica children by only removing and replacing soil. We can't remove and replace soil to declare soil pica behavior safe.

From a community perspective, the soil removals included in Alternative 5 may not provide the highest overall protection since it is likely that other sources of lead exist that would not be identified under this alternative and the occurrence of soil pica behavior would not be affected. The large number of additional soil removals would entail greater short term risks however, leading to the conclusion that there is not an overall greater protection of human health for the increase in cost associated with Alternative 5.

5. Short Term Effectiveness: If the evaluation is based on truck traffic, why is Alternative 2 less effective than Alternative 3?

EPA response:

Short term effectiveness considers the time for implementation as well as risks to the community and workers during implementation. EPA revised the proposed plan to explain that there is some uncertainty about whether the treatment of lead in soil would be effective. More testing would be required to determine exactly how the treatment process would work. So, alternative 2 would take more time to implement than soil removal alternatives, making it less effective in the short term. EPA also considered that there would be less short term risk of accidents occurring since the soil at the 89 properties that would undergo treatment would not need to be removed and transported off site. Although there is less short term risk of accidents, the uncertainty in the treatment process and the time to implement alternative 2 make it less effective in the short term than alternative 3.

7. Cost Effectiveness: CDPHE does not agree with the conclusion that Alternative 4 and Alternative 5 do not provide greater overall protection for the increased cost. Again, this seems to discount the benefit of cleaning up more properties.

EPA Response:

EPA carefully considered all the information in the Administrative Record to evaluate the overall protection of human health provided by each alternative. The information supports the following determinations:

Alternatives 4 and 5 do not provide greater overall protection of human health for the increased cost. The additional soil removals required in Alternatives 4 would address reasonable maximum point estimates of cancer risks within EPA's acceptable risk range (between 8×10^{-5} and 10^{-4}) and would provide this protection for the 99th percentile of the exposed population, exposures which are likely **not** occurring at the site. The additional soil removals would also not effectively address the theoretical risk of acute effects from soil pica behavior. The information in the Baseline Human Health Risk Assessment and the Feasibility Study demonstrates that, because it is not known how much soil children with pica behavior ingest, under some scenarios there theoretically is a concern about acute effects from exposure to arsenic in yards with background levels of arsenic in soil. EPA concludes that it is more effective to address the theoretical health risks associated with soil pica behavior by implementing a comprehensive program that includes as one component, strategies to reduce the behavior. In other words, we can't remove and replace soil to declare soil pica behavior safe. The additional soil removals required in Alternative 4 would not appreciably reduce the risks associated with soil pica for the above reason and also because the hazard quotients at yards where soil was not removed is predicted to be between 4 and 20. The additional soil removals would entail greater short term risks however, leading to the conclusion that there is not an overall greater protection of human health for the increase in cost associated with Alternative 4. EPA guidance requires that short term risks be considered in the evaluation of overall protection of human health.

In the case of Alternative 5, the additional soil removals would also address risks within EPA's acceptable risk range, also providing this protection for exposures which are likely **not** occurring at the site. Unlike the other alternatives, Alternative 5 contains no community health program and therefore will not address the theoretical risk of acute effects to children with soil pica behavior as effectively as those alternatives that include the community health program option. In addition, from a community perspective, Alternative 5 may not provide the highest overall protection since it is likely that other sources of lead exist that would not be identified under this alternative and the occurrence of soil pica behavior would not be affected. The large number of additional soil removals would entail greater short term risks however, leading to the conclusion that there is not an overall greater protection of human health for the increase in cost associated with Alternative 5.

8. State Acceptance: The notes need to be expanded to explain why CDPHE prefers Alternative 4. Please refer to state comments on the Feasibility Study for rationale supporting the state's preference for Alternative 4 or the CDPHE would be happy to provide EPA with language as to State Acceptance of Alternative 4.

Suggesting language could be: "CDPHE proposed selecting a more protective cleanup level than was offered in Alternative 3. Since there are no technical reasons why a lower

cleanup level could not be chosen, CDPHE suggested an alternative that would provide a level of protection equivalent to that provided to other North Denver residents.

EPA Response:

EPA considered CDPHE's suggestion and found that it is not necessary to perform soil removals where arsenic exposure point concentrations exceed 128 ppm in order to achieve protectiveness equal to the level of protectiveness provided to other North Denver residents. This is supported by information in the Baseline Human Health Risk Assessment. Since data specific to Globeville are not available for the soil/dust ratio, relative bioavailability of arsenic in soil, nor the fine/ bulk ratio, the RME cancer risk associated with exposure to 70 ppm arsenic in soil (the action level for arsenic in residential soil at the Asarco Globe site) is determined by multiplying 70 ppm by the unadjusted Human Intake Factor (HIF) developed using standard exposure assumptions for the residential reasonable maximum exposure scenario and the unadjusted cancer slope factor for arsenic. The unadjusted HIF for chronic exposure to soil is developed in Section 4 of the final Baseline Human Health Risk Assessment and can also be found in Appendix E of that document.

RME cancer risks for 70 ppm soil in Globeville:

[70ppm] x [HIF (unadj.)] x [unadjusted slope factor] = 2×10^{-4} .

This risk level only considers exposure to soil. The addition of exposure to garden vegetables would result in a cancer risk greater than 2×10^{-4} at 70 ppm. Alternative 3 requires soil removals at all yards where the point estimate of cancer risk exceeds 10^{-4} , and RME risks exceed the range 2×10^{-5} to 7×10^{-5} . Therefore, the additional soil removals required in Alternative 4 are not necessary to achieve a level of protection against cancer risk equal to that provided by the State for Globeville residents. There is no basis for stating that Alternative 4 provides a level of protection equivalent to that provided to other North Denver residents.

The extra level of protectiveness will help address specific Environmental Justice concerns, other chemical exposures in the VBI70 community, and evidence of additional cancer burden in the community, all of which indicate that this community might benefit from additional risk reduction strategies.

EPA Response:

We agree that information we have reviewed about chemical exposures in the VBI70 community from sources other than residential soils (primarily sources of air pollution) and the preliminary information provided by the State on cancer incidence in the VB/I70 community indicate that additional risk reduction strategies beyond the Superfund

remedial action may be needed to protect public health in the VB/I70 area. In order for such strategies to be effective, they must target the sources, chemicals, and exposure pathways that are contributing most to the increased risk in the community. As we have discussed, EPA proposes as part of remedial action to develop an area wide conceptual model that will not be limited to the consideration of the VB/I70 Superfund Site sources. This model will assess multiple sources of contamination, chemicals of concern, release mechanisms, transport mechanisms, exposure pathways, and people who are exposed. The resulting analysis will then be used to identify areas where potential risks are highest. Efforts to address cumulative impacts can then be prioritized to achieve risk reduction in these areas.

Until the work is completed to better understand the exposure pathways and the chemicals of concern that are contributing to cumulative risk, there is no basis for stating that additional soil removals as provided by Alternative 4 will have any effect on risks associated with other chemical exposures in the community. There is no information to indicate that the additional yards to be removed in Alternative 4 are located in the areas of the highest cumulative impacts in the study area since the initial work to identify such areas has not been done. In addition, the draft cancer incidence study does not indicate an association between additional cancer cases in the VB/I70 area and exposure to arsenic in soil. EPA believes it will mislead the community to declare that the additional soil removals will have any effect on the risks associated with cumulative exposure to multiple chemicals or the additional cancer burden.

The state suggests adding another row to the table titles Community Acceptance and leaving it blank or "To Be Determined" so that the community can see where their acceptance fits into the larger picture.

EPA Response:

The requested change has been made.